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ABSTRACT

Three induced affect (IA) studies are reported. Their goal was the development of a methodology for inducing and quantifying specific affective states in a controlled setting, with the ultimate purpose of making the detailed study of affective states more feasible. Euphoric by moderate autonomic activation were elicited with cue manipulation in the IA paradigm in subjects differing in level of adjustment. Physiological (pulse and respiration rate) and self-report measures were employed, and these proved sensitive to transitory changes in euphoric and dysphoric states. Suggestions are offered for the application of these methods. (KS)

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The Induction of Euphoric and Dysphoric States with Induced Affect

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The data that we are going to present this morning was collected at Purdue University as part of an ongoing program of research using the induced affect (IA) paradigm. IA began as a clinical affect induction therapy procedure designed to promote behavior change. We are not going to discuss IA as a behavior change technique, but rather, the IA research paradigm and its general problems for studying the domain of motivation and emotion. Specifically, the data we will present is drawn from three IA studies conducted at Purdue, whose goal was the development of a methodology for inducing and quantifying specific affective states in a controlled setting.

Before presenting our data, we would like to address the question of why this research was undertaken. The answer that seems most appropriate is that the development of a determinant science of affective states, if possible, must follow the development of an experimental methodology for manipulating and measuring affective state phenomena. We believe that our work represents one possible approach to the development of the requisite methodology for the study of affective states.

Now, an overview of the IA paradigm. The procedure involves four phases. The first phase is a baseline phase included to allow subjects to adapt to the experimental setting. During this phase subjects are instructed to rest quietly in a reclining chair until the experiment is initiated. This baseline phase is followed by an initial relaxation phase. This phase involves the use of relaxation instructions to restrict attention together with verbal reinforcement for achieving a behaviorally quiescent state. An affect elicitation phase follows this relaxation phase. Affect elicitation involves instructions to focus upon and experience affectively charged thoughts, images, and feelings together with contingent verbal reinforcement for overt emotional behavior. The final phase is a second relaxation phase prior to debriefing and discussion. In IA research, physiological and self-report indices of emotional state are secured following each of these four phases (baseline, initial relaxation, affect elici-

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tation, and final relaxation).

When applied in therapy, affect elicitation is non-specific by design, i.e., no specific affective state is suggested to the subject. This non-specific procedure forces a subject to draw upon whatever internal or external cues are available and salient to determine the tone of his/her response to the affect elicitation phase of the procedure. This process has been conceptualized in an attribution theory framework with the content and tone of a subject's response often used to infer internal states mediating maladaptive behavior. A wide range of affective responses have been observed to the IA procedure, e.g., anger, fear, uncertainty, sexual arousal, laughter, grief, etc. This range of response stimulated us to begin to ask two general classes of questions. First, we began to wonder what situational and/or dispositional factors govern response to the procedure. Second, we began to wonder if we could control the attribution process and hence develop a methodology for the induction of specific affective states. This second question is the focus of the data I will present this morning.

In our recent work, we have focused on the induction and quantification of euphoric and dysphoric states. These states were selected as the focus of our work primarily because the subjective dissimilarity of these states promised that specific, discriminative measures of the two states could be developed. Our work on the induction of euphoric and dysphoric states has involved three studies. The first set of data was an initial attempt to manipulate affective state with the IA procedure; this study was compromised by measurement problems. The second set of data concerns the development and preliminary validation of a four component self-report measure of affective state. The third study is a quasi-replication of the first study employing the self-report measure we developed to correct the measurement problems we encountered in our first attempt to manipulate affective state with the IA procedure. I will present these three sets of data individually before I try to summarize the results and suggest implications for future research on affective states.

Study 1

Previous IA data has indicated consistently that the transition from the initial relaxation phase to the affect elicitation phase of the IA procedure is characterized

by a shift from a quiescent physiological state to a state of autonomic activation. Based on the attribution data of Schacter and Bem, we reasoned that the subjective emotional experience of IA generated arousal could be differentially shaped by manipulating experimenter provided cues prior to and during an IA session.

In our initial attempt to selectively manipulate affective state, we manipulated rationales given prior to the IA procedure to provide differential cues for euphoric or dysphoric states. Three groups were involved in the study. After presenting the study as a psychophysiological investigation of affective states and describing the four phases of the IA paradigm (baseline, initial relaxation, affect elicitation, and final relaxation), an assistant further described the IA procedure as a standard laboratory procedure for inducing positive (happy, elated), negative (tense, anxious), or unspecified ("different people experience different feelings") affective states. Having provided the cue appropriate to the subject's group affiliation, the assistant left the room and the experimenter entered to conduct a standard IA session blind to the subject's group affiliation. The subjects for the initial study were 30 undergraduate females randomly assigned, 10 each, to the three groups (for all subjects, $N \pm 1$ s.d. and $L < 4$ on the Eysenck Personality Inventory).

The physiological dependent measures employed in this initial study were pulse and respiration rate. On the basis of the adopted attribution framework and Selye's stress research, we hypothesized that no group differences would be manifest on these indices of activation during affect elicitation. As can be seen in Figure 1, this hypothesis was confirmed. The Groups X Phases interaction associated with this figure was non-significant ($F < 1$). Changes in pulse rate across phases, however, was significant ($F_{3, 72} = 20.65$; $p < .001$). Similarly the Groups X Phases interaction failed to reach significance for respiration rate ($F < 1$) although the phases main effect approached significance ($F_{3, 72} = 2.58$; $p = .06$). As predicted, these indices of activation failed to discriminate the groups, but supported our contention that activation, hypothetically a necessary condition for affective phenomena, was manipulated by the IA procedure.

Three self-report measures of affective state were employed in the initial study. The first was the anxiety scale from the Curran-Cattell Eight State Battery. The second was a modified version of the depression scale from the Eight State Battery. Curran and Cattell contended that their scales were bipolar, so we reasoned that a state euphoric scale could be created by reversing the scoring criteria on their

state depression scale. Vignettes written by subjects following their IA session were the third self-report index of affective response to the IA procedure. Each subject was instructed to write a brief paragraph describing the content, tone, and intensity of her feelings during affect elicitation. Vignettes were subsequently rated on a battery of semantic differentials designed to assess affective tone.

The two Curran-Cattell scales failed to discriminate groups. The phases main effect was signiticant for the anxiety scale ($F_{6, 72} = 8.64$; $p < .001$) suggesting that affective state had been manipulated, but the Groups X Phases interaction did not reach significance ($F < 1$). State anxiety means are presented in Figure 2. No significant effects were obtained on the modified depression scale. Vignette data, however, weakly supported our contention that euphoric and dysphoric states had been differentially induced with the IA procedure (interrater reliability = .84; $F_{1, 24} = 2.65$; $p < .08$; $\omega^2 = .14$).

The results of this initial study were contradictory and inconclusive. Our feeling at the time, however, was that our dependent measures had been poorly chosen and that the study had been a poor test of our speculations that specific affective states could be elicited with the IA procedure by manipulating setting cues. The next data I will present describes the development of a four component measure of affective state designed to overcome the shortcomings of our initial dependent measures.

Study 2

Our attempt to selectively manipulate affective state was not the first time we've encountered problems with the measurement of affective state. Although there are several current measures of state anxiety, measures of other states are not widely available. In general, the utility of the multiple state instruments we were able to locate was compromised by two recurrent problems. First, the scales were so long that there appeared to be a danger of deflecting transitory changes in state by the rating task itself. Second, evidence of discriminant validity was conspicuously absent for instruments purporting to measure multiple states.

I can only briefly describe the development of our Affect Rating Scale (ARS).

At the time we developed the scale we were skeptical about the feasibility of developing valid measures of specific affective states, e.g., fear, anger, etc., so we adopted a semantic space approach to the measurement of affective state. Assuming unipolar states and two semantic space dimensions, evaluation and potency, four discrete affective states are possible: potent positive, potent negative, weak positive, and weak negative affective states.

Working from an initial data pool of 40 adjectives rated by 244 females on Likert scales anchored by "not at all" to "very much", a 24 item scale designed to measure these four components of affective state was constructed. Using a principle components data reduction procedure with varimax rotation, adjectives were deleted from our original 40 adjective scale until a 24 item revised scale was derived on which six adjectives loaded simply on each of the four unipolar, semantic space components. The component structure was cross-validated on a sample of 268 males ($\bar{p}$ = .998 and -.003 for matching and non-matching components respectively). Weights for estimating component scores were then derived from the pooled sample of 512 males and females.

Evidence for the validity of the ARS components has been collected and the scales have fared well so far. Given the time constraints of this presentation, I will briefly describe one set of validation data, as it is pertinent to the final study I will present this morning.

In the first IA study in which the ARS was employed, there were no manipulations designed to influence tone of response to the procedure. Post-session vignettes similar to those I described earlier and pulse rate were also collected. Following that study, two judges rated 40 vignettes from the study and independently selected the 10 most euphorically and dysphorically toned vignettes from the sample. Using the selection criterion of mutual agreement between the two raters, 7 subjects were selected for a group of subjects having reported unambiguously negative affect and 5 subjects were selected for a group of subjects having reported unambiguously positive affect during affect elicitation.

The four ARS components were analyzed in 2 X 5 (groups, phases) ANOVAS. During affect elicitation the euphoric and dysphoric groups were distinguished by the potent positive, potent negative, and weak positive ARS components ($F's_{1, 10}$ = 9.4, 27.7, and 8.7, $p's < .01$, ϵ^2 = .44, .71, and .41 respectively). Consistent with

the first set of data I presented, analysis of pulse rate data from the two groups ($F_{4, 40} = 5.3$, $p < .01$), but the level of activation did not differ between the two groups ($F_{4, 40} = 1.86$, $p = .14$).

Table 3 contains means for the euphoric and dysphoric groups on the potent positive and potent negative ARS components. This figure is presented in support of the unipolar dimensionality of the ARS components. Increases in positive affect were not accompanied by significant decreases in negative affect for euphoric subjects and vica versa for dysphoric subjects.

The data I just described confirmed that both euphoric and dysphoric states occur during the affect elicitation phase of IA and contributed to the construct validation of the ARS scales. The data, however, did not answer the question of whether euphoric and dysphoric states could be selectively induced with the IA procedure.

Study 3

The third study represents an attempt to selectively induce these two states in two groups of subjects.

The subjects for this third study were 24 undergraduate males, 12 of whom scored more than one standard deviation above the mean, and 12 of whom scored more than one standard deviation below the mean on Eysenck's Neuroticism scale($E \pm 1$ s.d. and $L < 4$ for all subjects). Groups differing in level of adjustment were included in this study to test if our procedures were equally effective with subjects differing in trait level of emotional reactivity.

Before initiating an IA session, subjects were briefed with half of the subjects in each Eysenck group receiving a rationale emphasizing the induction of a euphoric state while the remaining half received a rationale emphasizing the induction of a dysphoric state. The affect elicitation procedure was a modified version of the IA procedure we used in our first attempt to manipulate affective state. In contrast to the earlier procedure, the experimenter was not blind to subjects' assignment to the euphoric or dysphoric group; however, the experimenter was blind to the subjects' adjustment status as measured by the Eysenck scale. The affect elicitation phase of the IA procedure was modified to permit the experimenters to elicit subjects' disclosure of their feelings at three points during the 8 minute affect elicitation phase. Disclosures appropriate to group assignment were verbally

reinforced. Inappropriate responses, i.e., disclosure of dysphoric feelings from subjects assigned to the euphoric group, were countered with a variant of Lazarus's time projection technique, e.g., "I hear you are feeling angry and frustrated now, but I'd like you to think ahead to a time when that's behind you...".

Dependent measures for the third study included pulse rate, the four ARS components, and vignettes written following IA sessions. As in the two previous sets of data I have presented, there was a main effect for phases on pulse rate ($F_{3, 60}$= 21.45, $p < .001$), and this index of activation failed to discriminate the euphoric and dysphoric groups ($F_{3, 60}$=1.83, p= .14). Pulse rate data is depicted in Figure 4. Univariate ANOVAS on the ARS components showed significant Groups X Phases interactions for the potent positive, potent negative, and weak positive components ($F's_{3, 60}$= 8.26, 21.51, and 7.78 respectively, with p's $< .001$). The means associated with these analyses are presented in Figures 5, 6, and 7. At a marginal level of significance, ratings of vignettes were consistent with these ARS results (interrater reliability= .91; $F_{1, 20}$= 2.98, p= .09). These results collectively confirm that euphoric and dysphoric states accompanied by a moderate amount of autonomic activation were selectively induced by cue manipulations within the IA paradigm.

The question of the generalizability of these results remains. For example, is the procedure effective only with some limited group of subjects? To test the generalizability of the affect elicitation procedures across the two groups defined by high and low neuroticism scores on the Eysenck Personality Inventory, a MANOVA was performed on the ARS scores with the euphoric and dysphoric groups as a between subjects factor (Λ = .28, $p < .001$, R^2_c = .85). Our intention was to use the associated discriminant function for the ARS components (.45 (Potent Positive)-1.12 (Potent Negative)+.54 (Weak Positive)) to classify each subject into either the original euphoric or dysphoric group and look at the distribution of misclassified subjects between the high and low neuroticism groups. Only two of the 24 subjects were misclassified (χ^2= 16.67, $p < .001$), however, aborting this analysis and suggesting that the procedure had been equally effective with both high and low scoring groups on Eysenck's Neuroticism scale.

Conclusions

In summary, euphoric and dysphoric states characterized by moderate autonomic activation can be elicited with cue manipulations in the IA paradigm. The

procedure was effective across samples of subjects differing in level of adjustment, and we derived a measure sensitive to transitory changes in euphoric and dysphoric states. One weakness we perceive in the data is the level of activation engendered by the procedure. We did not effectively raise pulse rate during affect elicitation above base values. For the dysphoric group depicted in Figure 4, the affect elicitation pulse rate mean is significantly above the baseline mean ($F_{1, 60} = 8.74$, $p < .01$) but the absolute magnitude of the effect is small. For the euphoric group, the affect elicitation pulse rate mean does not differ significantly from the baseline mean ($F < 1$). In part this problem is attributable to our 8 minute adaptation period. We are aware of data collected at Purdue which shows that the initial phase of a psychology experiment is a stressful experience for undergraduates as measured by a time estimation task. Hense, contrasts between our "baseline" and affect elicitation pulse rates may more accurately represent a contrast between two stressors. This can be corrected with a longer adaptation period. Another procedure we intend to implement is the use of range corrected scores in data analysis.

At this point we feel our primary contribution is methodological. We have derived a methodology for selectively inducing and measuring affective states. Currently we are working to generalize the procedures to the selective elicitation of anger and fear states. This work, we hope, may have clinical as well as research applications. Another long range application of the procedure would be an investigation of the interaction between internal and external cues in the attribution process that has been hypothesized to mediate emotional experience.

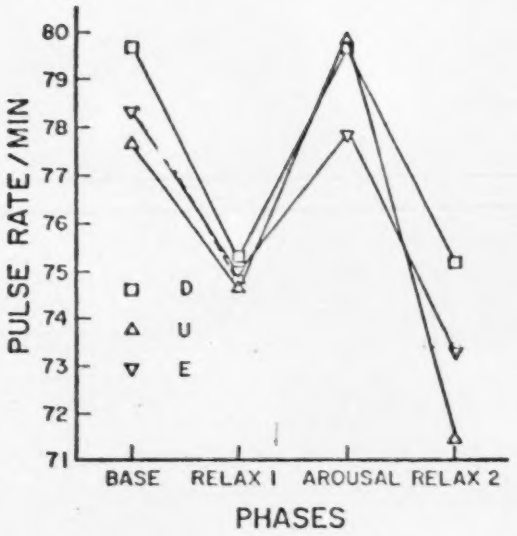

Figure 1. Group X Phase means on pulse rate from Study 1.

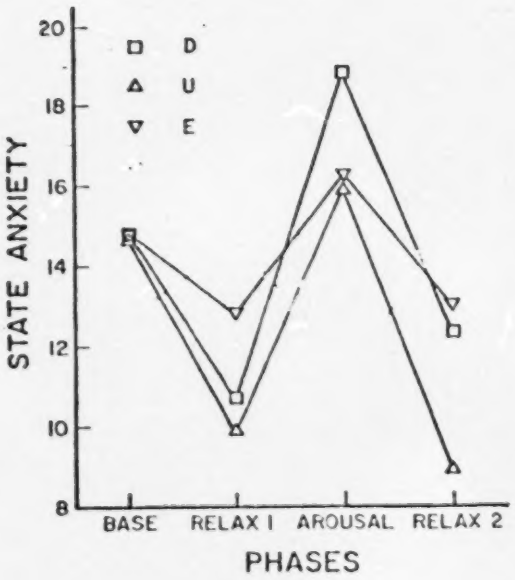

Figure 2. Group X Phase means on the Curran-Cattell Anxiety Scale from Study 1.

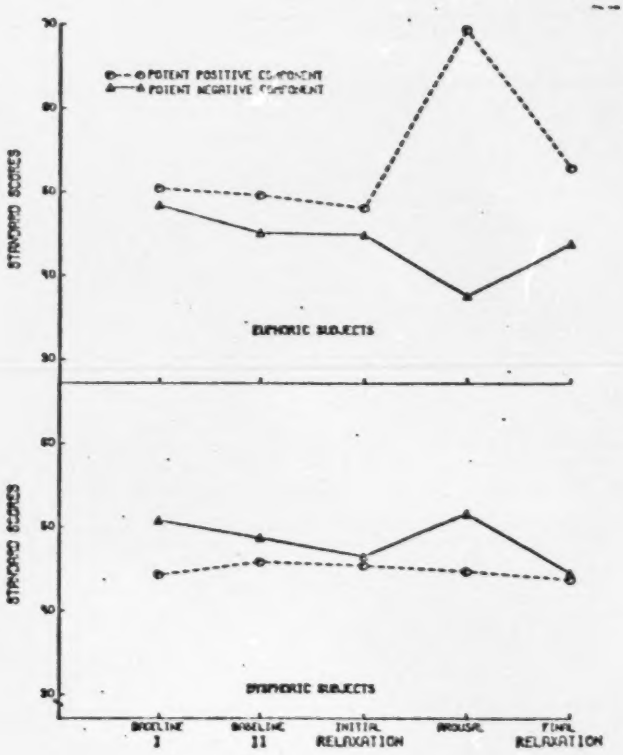

Figure 3. Group X Phase means on the Potent Positive (---) and Potent Negative (——) ARS components from Study 2. Euphoric subjects are in the top half of the figure and dysphoric subjects are in the bottom hafl og the figure.

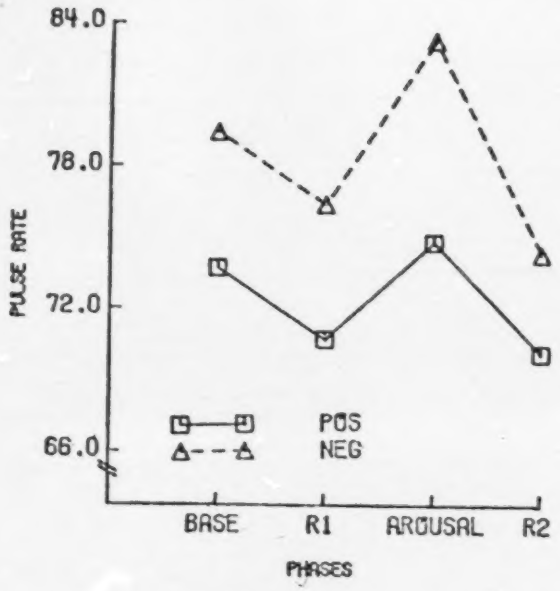

Figure 4. Group X Phase means on pulse rate from Study 3.

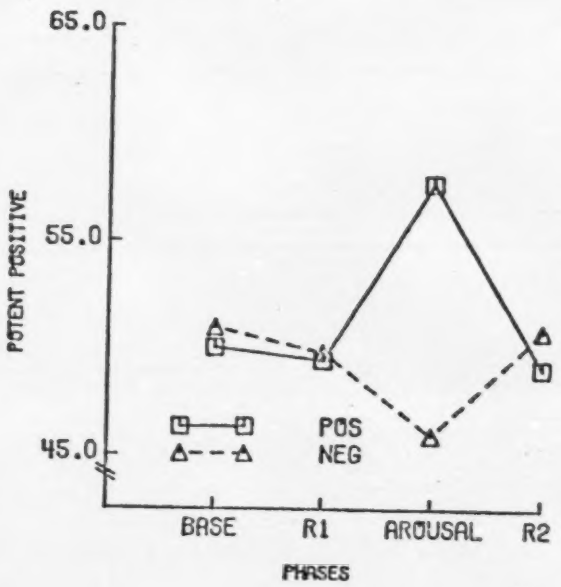

Figure 5. Group X Phase means on the Potent Positive ARS component from Study 3.

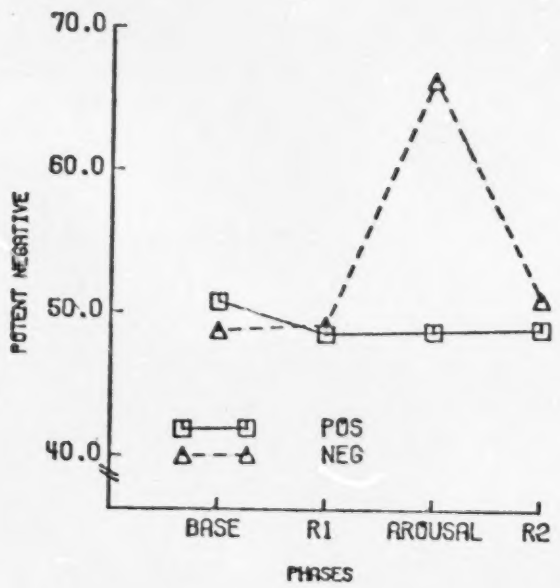

Figure 6. Group X Phase means on the Potent Negative ARS component from Study 3.

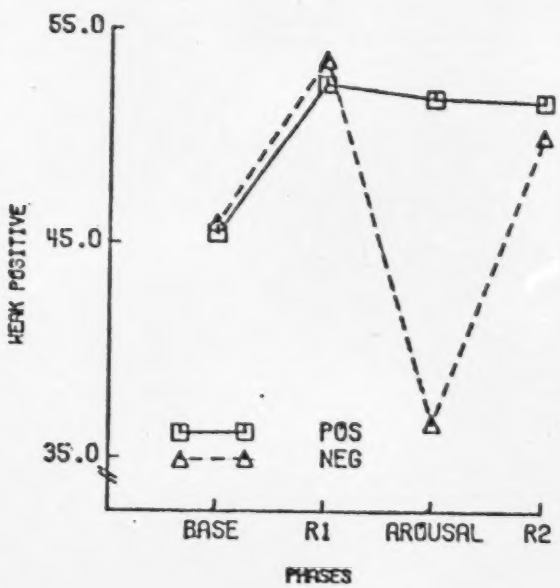

Figure 7. Group X Phase means on the Weak Positive ARS component from Study 3.

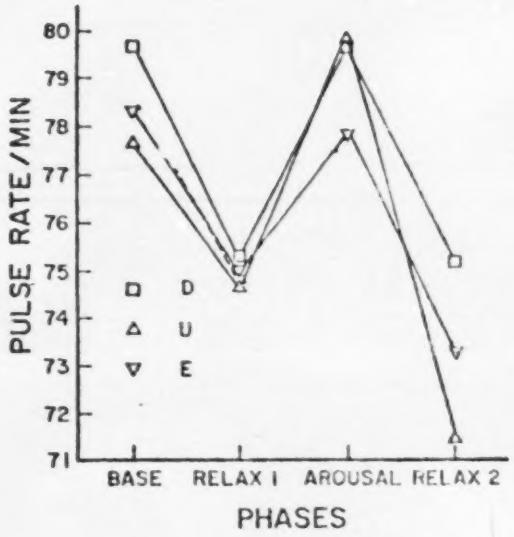

Figure 1. Group X Phase means on pulse rate from Study 1.

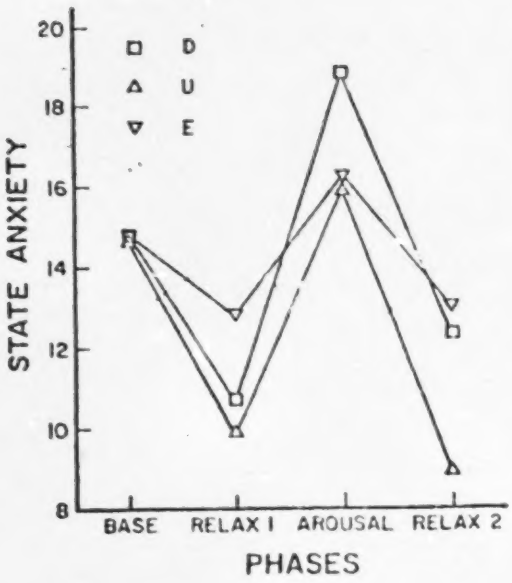

Figure 2. Group X Phase means on the Curran-Cattell Anxiety Scale from Study 1.

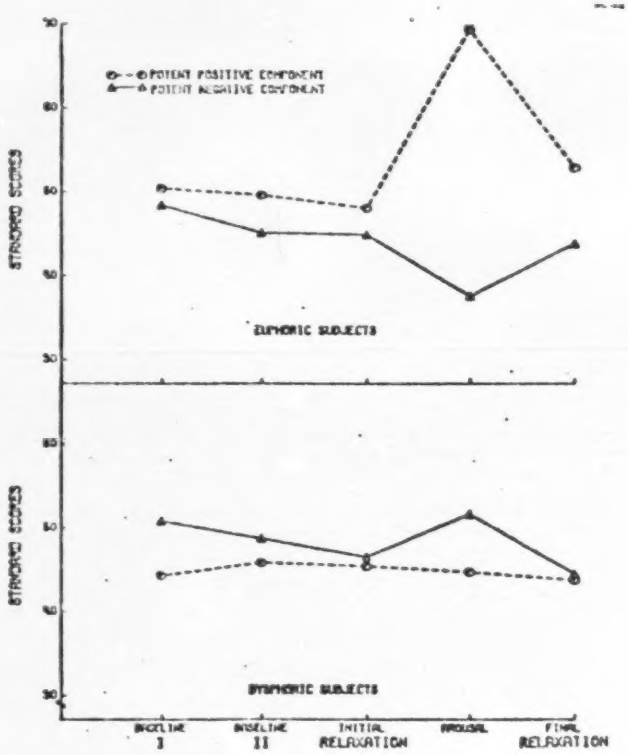

Figure 3. Group X Phase means on the Potent Positive (---) and Potent Negative (——) ARS components from Study 2. Euphoric subjects are in the top half of the figure and dysphoric subjects are in the bottom hafl og the figure.

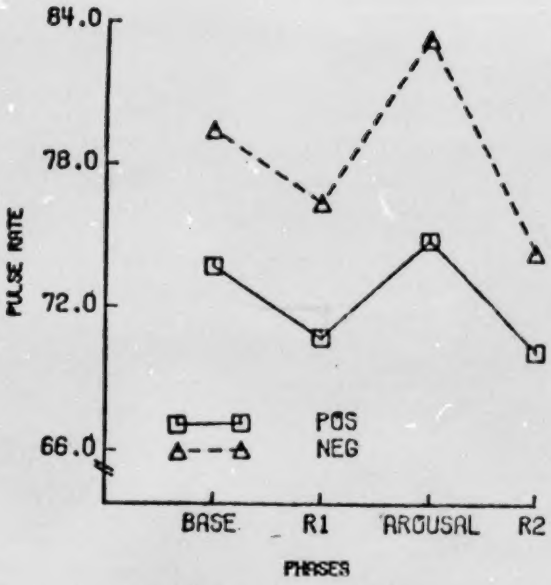

Figure 4. Group X Phase means on pulse rate from Study 3.

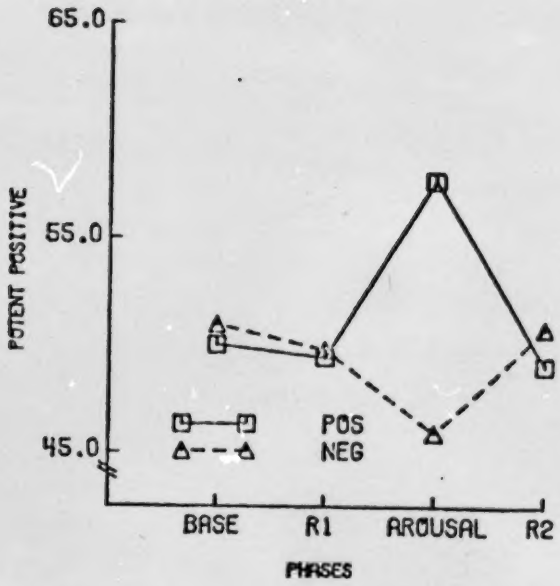

Figure 5. Group X Phase means on the Potent Positive ARS component from Study 3.

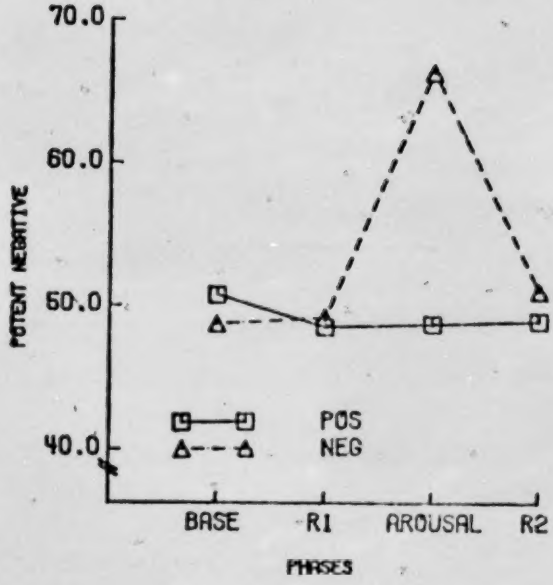

Figure 6. Group X Phase means on the Potent Negative ARS component from Study 3.

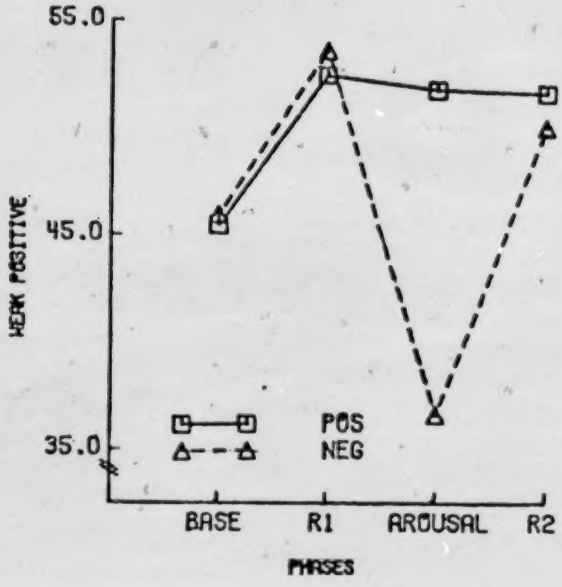

Figure 7. Group X Phase means on the Weak Positive ARS component from Study 3.